(12) UK Patent Application (19) GB (11) 2 001 285 A

(21) Application No **7829237**
(22) Date of filing **7 Jul 1978**
(23) Claims filed **7 Jul 1978**
(30) Priority data
(31) **2730669**
2755109
2804235
(32) **7 Jul 1977**
10 Dec 1977
1 Feb 1978
(33) **Fed Rep of Germany (DE)**
(43) Application published **31 Jan 1979**
(51) **INT CL²**
B43K 7/02
B05C 17/00
(52) Domestic classification
B6P AHB
B2L 106A 125 B
(56) Documents cited
GB 1453605
GB 1124464
GB 999324
GB 411573
GB 201053
(58) Field of search
B2L
B6P
F1R
(71) Applicants
Bruno Albrecht KG,
Orangeriestr. 6,
D-4000 Dusseldorf,
West Germany.
(72) Inventors
Bernhard Dietz
Lutz Gerbl
(74) Agents
Marks & Clerk.

(54) **Pen for applying adhesive**

(57) Pen for applying adhesive with an outlet aperture for the adhesive, which closes by means of a ball (4) located within the pen, having a slightly greater diameter than the aperture (3) and partly pushed outwards by means of a spring (5) through the aperture, characterised in that, the pen has two internally sliding telescopic tubes (1,2), of which one tube (2) has the said aperture (3) as well as an axially moving piston (6) with an outlet duct (6c), the said piston bearing against the said spring (5), whereas the other tube (1) is suited to receive a cartridge (7) containing the adhesive, the front end of the cartridge extending to the piston (6) and the rear end (7b) extending to the closed end (8) of the tube (1), and the wall (7a) thereof deforming flexibly in the longitudinal direction. The piston (6) has a spike (6b) for piercing the cartridge. In an alternative arrangement (figure 4 (not shown)) the piston is located in an axially compressible shell (11).

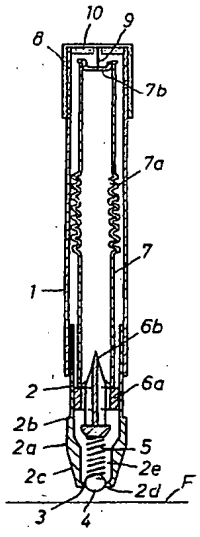

Fig.1

GB 2 001 285 A

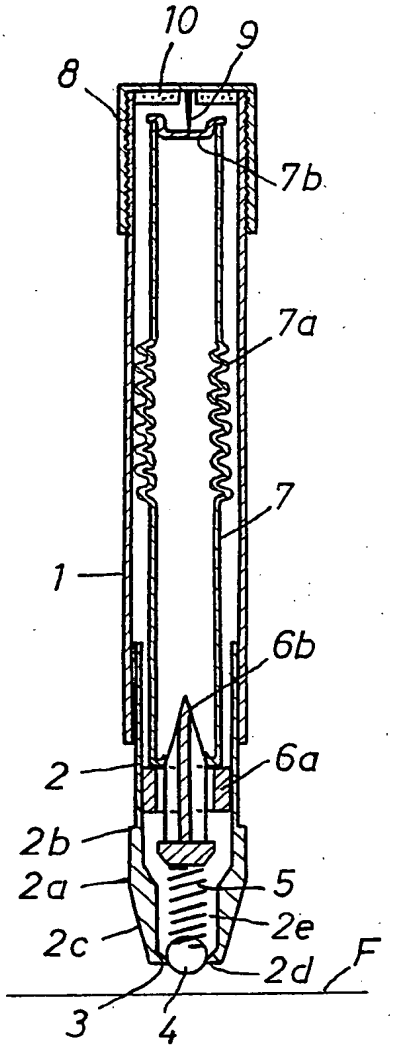

Fig.1

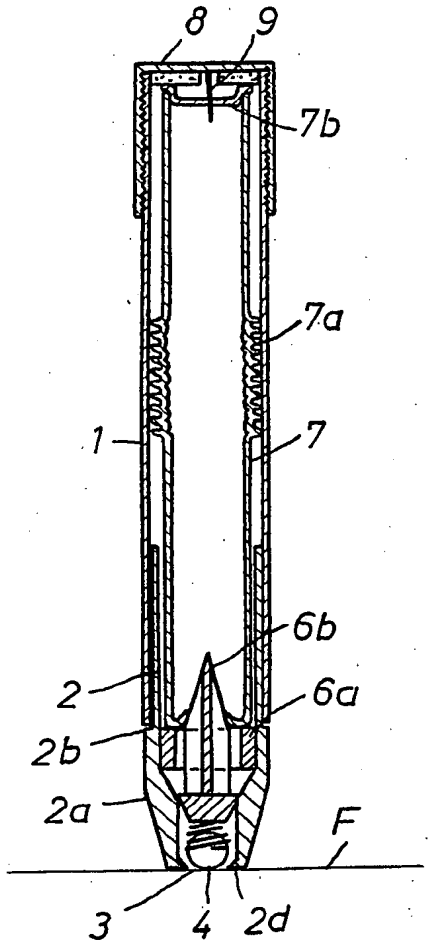

Fig.2

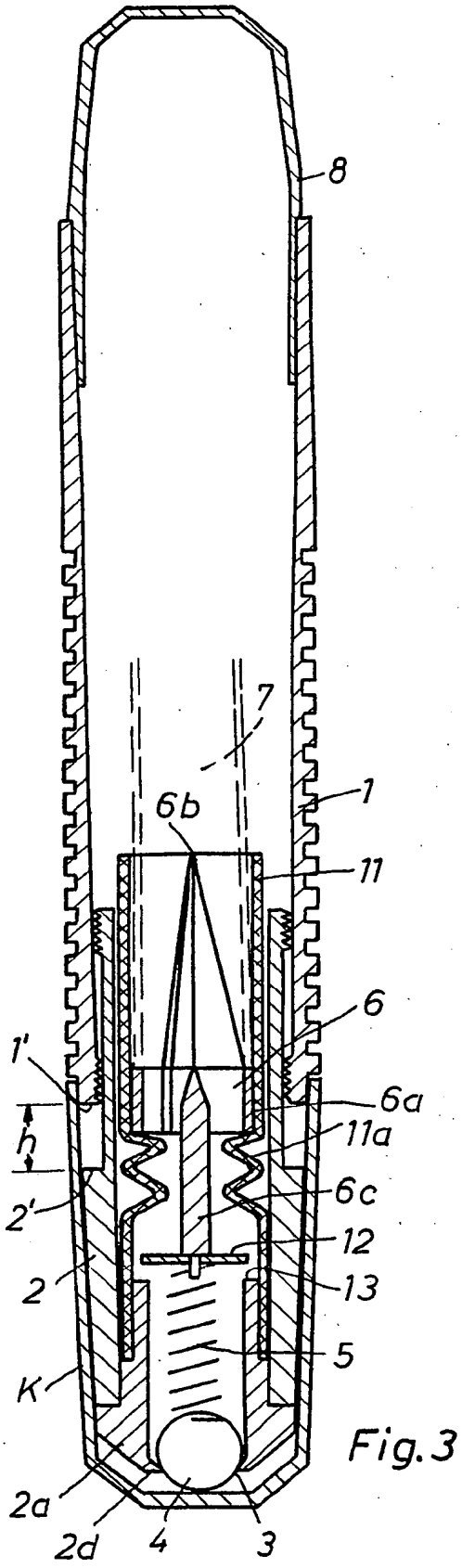

Fig.3

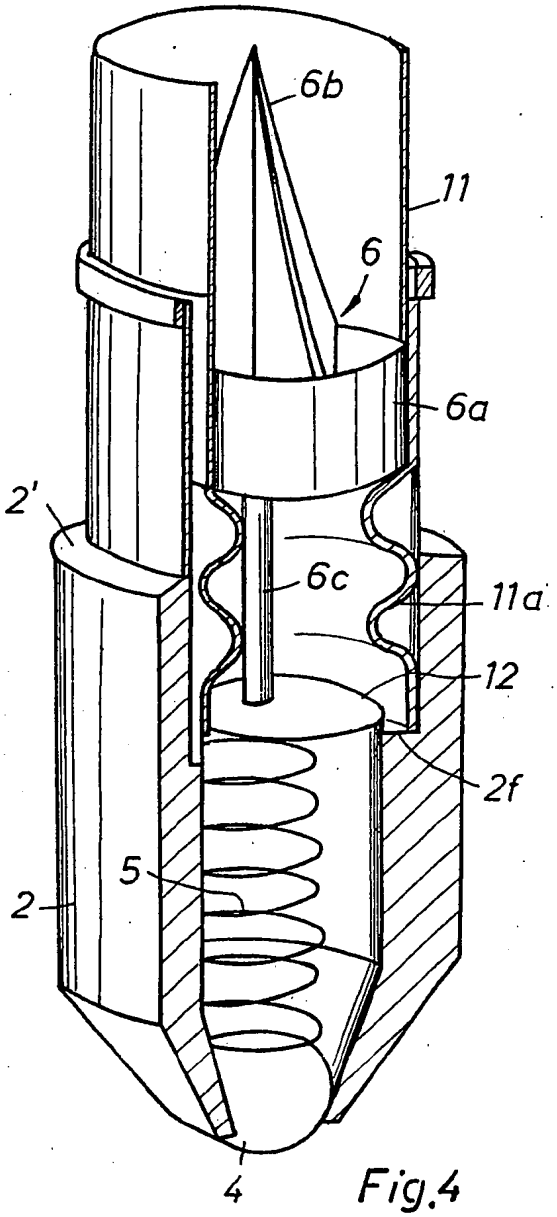

Fig.4

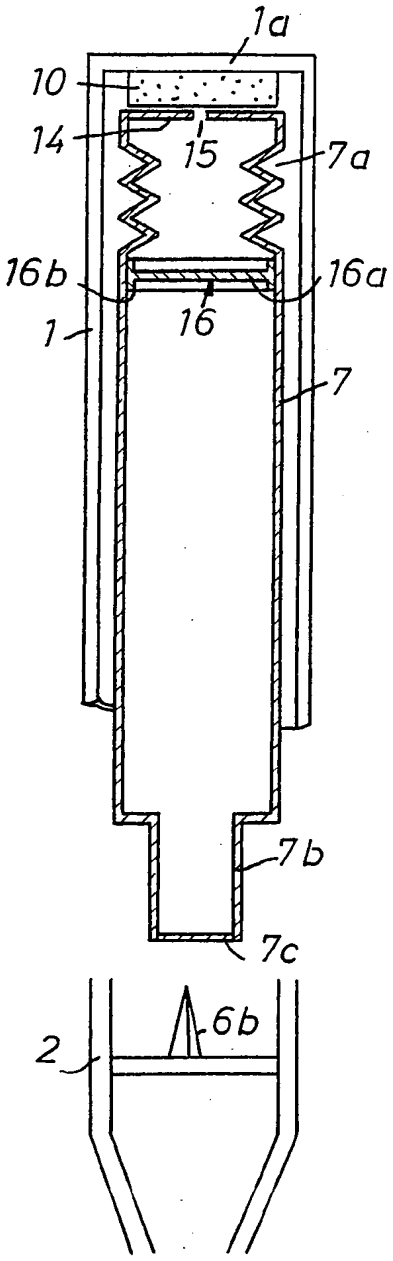

Fig.5

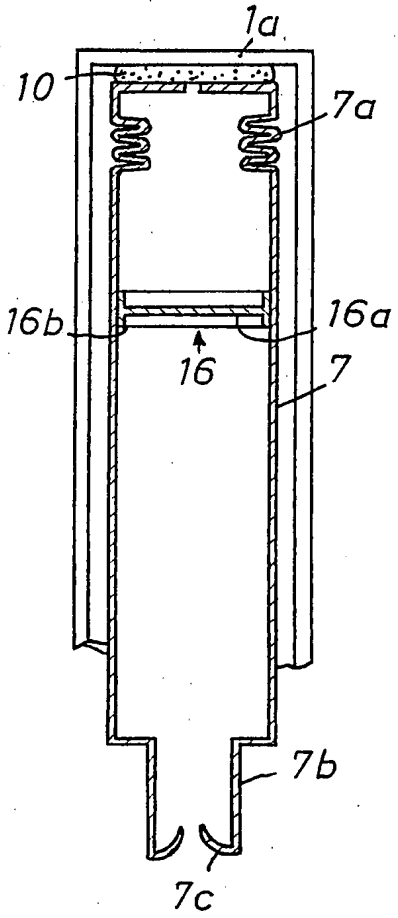

Fig.6

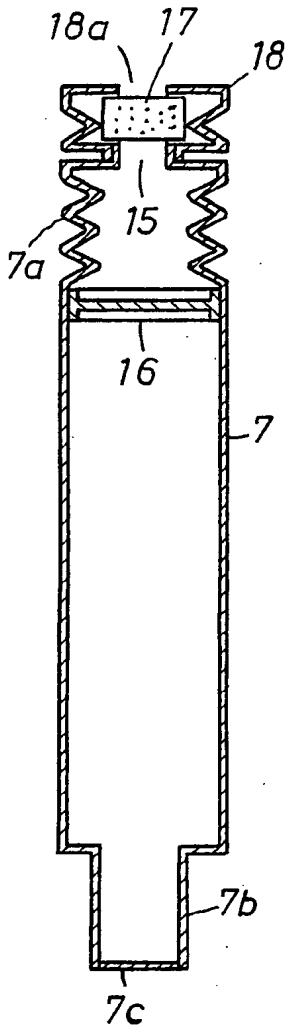

Fig.7

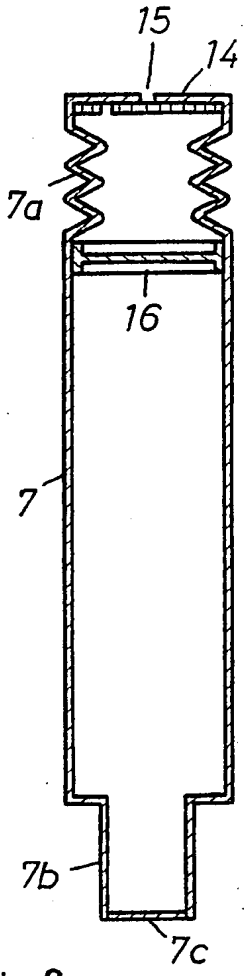

Fig.8

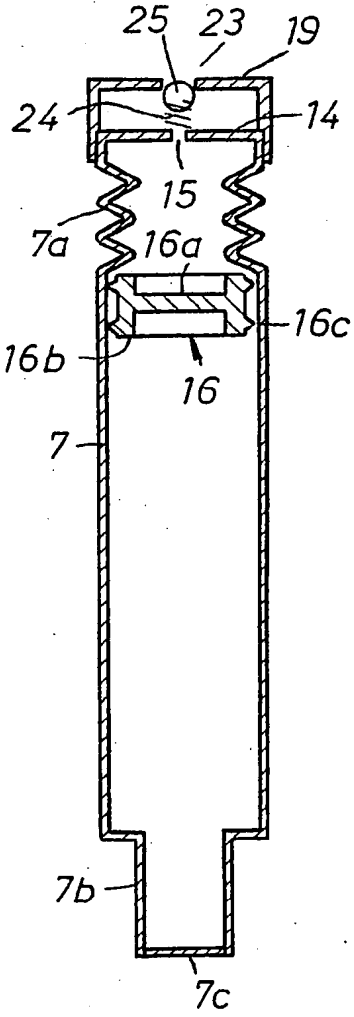

Fig.9

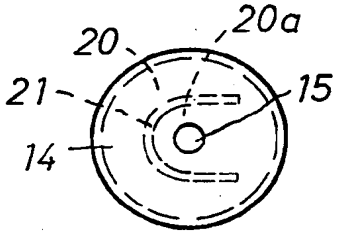

Fig.10

SPECIFICATION

Pen for applying adhesive

The invention relates to a pen for applying adhesive. Pens of that type are known, in which the discharge aperture for the adhesive may be sealed off by means of a closure, namely a ball, located within the pen and of somewhat smaller diameter than the aperture, and partly pushed to the outside of the aperture by means of a spring.

Pens of this type may only be used for lower viscosity types of adhesive and have the disadvantage that even with lower viscosity types of adhesive and have the disadvantage that even with lower viscosity adhesives, a considerable amount of adhesive can not be made to discharge from the pen.

The purpose of the invention is to achieve a pen, not having this disadvantage, allowing easy and frequent refilling at will and in which any bonding of the moving parts of the pen is excluded.

According to the invention this purpose is achieved in that the pen has two telescopically sliding tubes, one inside the other, of which the one tube has the said aperture as well as an axially moving piston with a discharge bore against which the said spring comes to bear, whereas the other tube is suited to receive a cartridge containing the adhesive, with its front end extending up to the piston and its rear end extending up to the closed end of the tube, and having flexibly deforming longitudinal walls.

The piston preferably has a pin for piercing the cartridge, on the end facing the cartridge. The pin is preferably of such a design, that the first-named tube has an axial annular chamber connected to the discharge aperture, the diameter of the piston being practically the same as that of the said annular chamber, and the end of the piston being at such a distance from the aperture, that it comes outside the chamber when the spring is released, and inside the chamber when the spring is under compression.

According to another design, the pen can be arranged so that between the first tube and the piston, a concentric axially compressable shell is located to move with the piston end away from the first aperture, whereas the end facing the aperture is sealed in relation to the first tube, a valve-plate of section smaller that the shell bore at that point and placed within the end part of the shell facing the aperture, being connected to the piston and having its seat on the first tube. The cartridge preferably consists of a flexible material which allows considerable compression longitudinally and resumes its original length on removal of the load. The cartridge may also be advantageously designed in such a manner that it will only compress flexibly by a fraction of its length, and has an air vent at the rear end, and contains a tansversely located piston moving longitudinally and eearing flush against the inner wall of the cartridge.

Further features and advantages of the invention are outlined in the following descriptions and in the following designs shown in the illustrations.

Figure 1 shows a longitudinal section through a pen according the invention and in the rest position,

Figure 2 shows a longitudinal section through the same pen in the operative position,

Figure 3 shows a large scale longitudinal section through another pen according to the invention,

Figure 4 shows a perspective in even larger scale of a vertical section through the front part of the pen according to figure 3,

Figure 5 shows a longitudinal section of a cartridge filled with adhesive for a pen according to the invention,

Figure 6 shows the same cartridge in longitudinal section following expulsion of part of the adhesive,

Figure 7, 8, 9 show other designs for such a cartridge,

Figure 10 shows a plan view of the cartridge shown in figure 8.

The pen illustrated in figures 1 and 2 shows two telescopically sliding tubes 1 and 2. Tube 1 is open at the end facing towards tube 2 and is closed by means of a screw-cap 8 at the opposing end. The tube 2 is open at the end facing tube 1 and at the other end has head 2a of external diameter at the rear end equal to the internal diameter of tube 1 and equal to the external diameter of tube 1 at the front end, so that tube 1 may slide over the rear end of tube 2, and a shoulder 2b is formed to serve as a stop to the movement of tube 1 in relation to tube 2. The front end of the head 2a is in the form of a tapering component 2c with a circular aperture 3, restricted by an annular lip 2d. A ball 4 of diameter somewhat greater than that of the aperture 3, is compressed by means of a spring 5 so as to form a seal with the aperture (see figure 1). The head 2a has a cylindrical recess 2e linking with the annular projection 2d, and of diameter smaller than the internal diameter of the tube 2. A piston 6 is axially guided in the tube 2 by means of a one-piece ring 6a and bears on spring 5. The external diameter of the piston-part 6 facing the spring 5 is the same as the internal diameter of the recess 2e, thus forming a cylinder for that part of the piston 6. The piston carries a triangular point 6b connected with the ring 6a to piece a cartridge 7 containing adhesive. The cartridge 7 is cylindrical, and of diameter somewhat smaller than the internal diameter of tube 2. It consists of a rubber-flexible easily deforming material of such elasticity that it effectively maintains its length in the unloaded condition.

The pen is used in such a manner that tube 1 is first withdrawn from tube 2, or the cap 8 is screwed off and the cartridge 7 is inserted into tube 1. On sliding the tube 1 on the tube 2, viz. on screwing on the cap 8, the cartridge 7 i spierced by the pin 6b, so that adhesive flows from the cartridge 7 through the duct 6c and inside the head 2a. In order to apply the adhesive to a surface F, the pen and the ball 4 are pressed against the surface F (see figure 2). This slightly opens the aperture 3 around the ball 4. At the same time, tube 1 is pushed in the direction of the arrow in relation to tube 2, adhesive being supplied through the duct 6c, the inside of head 2a and the aperture 3 for the surface F to be bonded. As soon as the front part of the piston 6 has penetrated the cylindrical recess 2e of the head 2a, a further supply of adhesive is provided from the cartridge, as a

result of the blocking of the piston 6 penetrating the recess 2a. After ceasing to depress the pen against the surface to be coated, the spring 5 pushes the ball into the aperture 3 and brings back the piston 6 into the initial position (figure 1).

The cartridge 7 has a bellows 7a, which allows axial compression of the cartridge 7, so that it resumes its original length on removal of the load. The elasticity constant of the bellows 5 is somewhat smaller than that of the spring 5, so that when pressing the pen upon a surface to be coated with adhesive the ball first exposes the aperture 3, after the cartridge 7 has been compressed longitudinally.

The closure cap 8 has a central needle 9 on the inside for piercing the bottom 7b of the cartridge 7, as well as a foam ring 10 surrounding the needle 9, and serving as a flexible seat for the cartridge 7.

The pen illustrated in figures 3 and 4 also shows two tubes 1 and 2 sliding telescopically inside each other. The tube 1 is open at the end facing tube 2 and closed at the other end by means of a screwcap 8. The tube 2 is open at the end facing tube 1 and is connected to a head-piece 2a at the opposing end. The external diameter of headpiece 2a and of the adjoining part of the tube 2 is larger than the internal diameter of tube 1. A gap h which can be increased or decreased by the axial movement of tube 1 and tube 2 in relation to each other, is allowed between end 1' of tube 1 and the facing end 2' of the thickened part of tube 2. The front end of the headpiece 2a has a circular aperture 3 narrowing into an annular shoulder 2d. A ball 4 of diameter somewhat greater than the aperture 3 is pushed against the aperture 3 by means of a spring 5 in such a manner as to seal it.

The lower end of a shell 11 made of easily deforming flexible plastic is located between the cylindrical surfaces of the headpiece 2a and the tube 2. The upper part of the shell 11 encloses a piston 6 consisting of a ring 6a, bearing flush against the shell 11 and fitted with a triangular spike 6b in one axial direction and bearing an axial rod 6c in the other direction, with a valve-plate 12 of flexible plastic on the lower end, so that the spring 5 presses against the valve-plate. The valve-plate 12 diameter is somewhat smaller than that of the internal diameter of the shell 11, but somewhat greater than the upper annular face 13 of the head 2a, serving as a valve-seat to the valve-plate 12. The shell 11 in the area between the ring 6a on the piston 6 and the valve-plate 12 is in the form of a bellows.

After removing the cap 8 a viscous adhesive-filled cartridge 7 is inserted in the pen. The lower end of the cartridge is pierced by the spike 6b on fitting and replacing the cap 8. The adhesive is then able to flow into the compartment within piston 6 and below the piston down to the ball 4, thus filling the cylindrical space within the headpiece 2a.

To use the pen the protective cap K is removed, the pen is then placed with the ball 4 against the surface to be coated and the pen is then pushed in the direction of that surface. The ball 4 is thus compressed against the spring-loading 5 inside the head 2a, whilst at the same time the valve-plate 12 is depressed against the seating 13. The adhesive or at least a considerable part of the adhesive inside the headpiece 2a then discharges from the aperture 3 of the pen and can be distributed by moving the ball 4 with the pen back-and-forth.

The valve-plate 12 fitting on the seating 13 prevents any further flow of adhesive between the cartridge 7 a d the inside of the headpiece 2a.

As soon as the pen is raised from the coating surface, the spring 5 pushes the ball 4 into a position whereby the aperture 3 is closed. The valve-plate 12a is then lifted off its seat 13, so that the adhesive may then flow from the cartridge 7 into the inside of the headpiece 2a.

The arrangement shown in figure 4 differs from that in figure 3 by the securing of the lower end of the shell 11. In figure 4 the headpiece 2a forming an integral component with tube 2 is inwardly enlarged complete with shoulder 2f to form a seat for the valve-plate 12, at the end away from the ball 4.

The cartridges shown in figures 5 to 10 consist of a flexible and easily deformed plastic. The greater part of the axial length is of cylindrical form 7, linking with a slightly reduced cylinder 7b at the front end. The cylinder 7 is sealed by means of a wall 7c at the front and by means of a wall 14 at the rear end, with a fine central aperture 15. A shorter part 7a of the cylindrical part 7 connecting with the wall 14 of the cartridge 7 is in the form of a bellows and is sealed at the rear by a wall 14 with a fine opening 15. At the transition of part 7a into part 7, a piston 16 sliding longitudinally in part 7 forms an integral part of a plate 16a and a ring 16b. The piston 16 may be of light suitably strong plastic. The inside pf the cartridge between the wall 7c and piston 16 is filled with an adhesive, for instance a viscous adhesive.

On placing the cartridge in a pen according tc figures 1 to 4 the wall 7b is pierced by the spike 6d of the pen, as barely indicated in figure 5. The adhesive then flows downwards into the recess of the front part of the pen. The shell 1 forming the rear part of the pen has an easily deformed flexible foam plate 10 on the inside of the sealing wall 1a. As a result of pressure against the wall 1a of the pen the plate 10 is compressed in such a manner as to form an airtight seal at the aperture 15 of the cartridge, so that simultaneously part 7a of the cartridge is compressed (see figure 6). As a result the air between the wall 14 and the piston 16 is compressed so that the piston 16 is pushed forward in the direction of the wall 7c of the cartridge. In this way a part of the adhesive in the cartridge is discharged through the pierced wall 7c. As soon as pressure upon the wall 1a of the pen ceases, the foam plate 10 and the bellows part 7a of the cartridge expand once more; air is consequently drawn through the aperture 15 into the inside of the bellows part 7a. On further pressure upon the wall 14, the process is repeated, so that repeated pressure against the wall 14 expells the adhesive from the cartridge. The air column in part 7a drives the piston 16 down again, so that on each pressure against the wall 14 adhesive is discharged from the cartridge.

In this way practically the whole of the adhesive in the cartridge is used, the adhesive always being maintained at the front end of the cartridge and

away from the air. Such cartridges allow the use of high viscosity adhesives as well as adhesives liable to harden or age when they come in contact with the atmosphere.

The valve consisting of the air inlet aperture 15 and a pressure-loaded component sealing the aperture, i.e. a foam plate 10, may be linked with the cartridge. Figure 7 shows an arrangement in which the aperture 15 at the centre of the wall 14 of the cartridge is relatively large and covered by a foam plate 10, seating in a bellows-formed part 18. As a result of axial pressure upon the upper wall 19 of the bellows shaped part 18, the foam-plate 10 and the bellows-formed part 7a of the cartridge is compressed, whereas on removing the pressure both components expand and air enters through the aperture 18a of part 18, the foam-plate 10 and aperture 15 in part 7a.

In the arrangement in figure 8 and 10 a thin plate of flexible material 20 is located on the inside of the wall 14 of the bellows part 7a of the cartridge. Plate 20 has a U-shaped slit 21, surrounding the opening 15 in the wall 14. This part 20a of the plate 20 surrounding the slit 21 thus forms a valve with aperture 15, which opens when the air pressure within part 7a is smaller than the external pressure, and closes when the air pressure in the bellows 7a is greater than the external pressure. The edge of the plate 20 may be bonded to the bellows 7a.

In the arrangement shown in figure 9, a cap with a circular central aperture 23 is located on the rear cartridge end secured by wall 14. The aperture 23 is sealed by a ball 25 with spring-loading 24, when the air pressure in the bellows shaped component 7a is greater than the external pressure. When the air pressure outside the cartridge exceeds the bellows 7a pressure to the extent of the spring force 24, the valve consisting of the ball 25 and the aperture 23 is opened. When pressure is exerted in the cartridge axial direction upon the cap 22, the bellows 7a is compressed and the air present inside is compressed in such a manner that the piston 16 is pushed forward. As soon as pressure upon the cap 22 ceases, the bellows 7a expand once more, air flowing through the valve 23, 25 and aperture 15 and inside the bellows part 7a, so that the piston 16 stays in position, where it was originally pushed.

In order to prevent the piston 16 from adhering to the wall of the cylindrical part 7 of the cartridge, a piston 16 is shown in figure 9, having a ring 16b with two small rings bearing upon the inner wall of part 7.

CLAIMS

1. Pen for applying adhesive with an outlet aperture for the adhesive, which closes by means of a closure located within the pen, having a slightly smaller diameter than the aperture and partly pushed outwards by means of a spring through the aperture, characterised in that, the pen has two internally sliding telescopic tubes (1,2), of which one tube (2) has the said aperture (3) as well as an axially moving piston (6) with an outlet the said piston bearing against the said spring (5), whereas the other tube (1) is suited to receive a cartridge (7) containing the adhesive, the front end of the cartridge extending to the piston (6) and the rear end (7b) extending to the closed end (8) of the tube (1), and the wall thereof deforming flexibly in the longitudinal direction.

2. Pen to claim 1, characterised in that, the piston (6) has a spike (6b) on the end facing the cartridge (7) for the purpose of piercing the cartridge.

3. Pen to one of claims 1 to 2, characterised in that, the first tube (2) links at the aperture (3) with an axial recess (2e), the diameter of the piston (6) at the end facing the aperture (3) being practically the same as the diameter of the recess (2e) and the end of the piston (6) being at such a distance from the aperture (3) that it comes outside the recess (2e) when the spring(5) is released, and inside the recess (2e) when the spring (5) is stressed.

4. Pen to claim 3, characterised in that, foam material (10) if located on the inside of the closure component (8) to act as a seating for the cartridge.

5. Pen to one of claims 1 to 4, characterised in that, the cartridge consists of a flexible material of such a nature that it will compress longitudinally by a considerable amount and mostly resume its original length on decompression.

6. Pen to claim 5, characterised in that, the spring constant of the spring (5) is greater than the spring constant of the cartridge (7).

7. Pen to one of claims 1 to 6, characterised in that, between the first tube (2) and the piston (6) a flexible axially compressable and concentric shell (11) is located and moves with the end away from the aperture (3) together with the piston (6), whereas the end facing the said aperture (3) is sealed in relation to the first tube (2), within which and facing the said aperture (3) of the shell (11) a valve-plate (12) is located having a section smaller than bore of the shell (11) at that point, being connected to the piston (6) and having its valve seat (13) on the first tube (2).

8. Pen to claim 7, characterised in that, the shell (11) is secured to the first tube by the end facing the aperture (3).

9. Pen to claim 7 or 8, characterised in that, the shell (11) forms a bellows (11a) in the zone between the piston (6) and the valve-plate (12).

10. Pen to one of claims 1 to 6, characterised in that, a parallel axis needle (9) is located on the inside of a removable cap (8) facing the aperture (3) for the purpose of inserting the cartridge (7).

11 .Pen to one of claims 1 to 9, characterised in that, the cartridge contains a longitudinally moving piston (6) lying transversely to the longitudinal axis, and flush with the inner wall of the cartridge (1).

12. Cartridge to claim 11, characterised in that, the piston (6) is in the shape of a plate (6a), its edge being formed as an expanded ring (6b).

13. Cartridge to claim 12, characteriesed in that, the expanded ring has two small rings (6c) bearing against the inner wall of the cartridge.

14. Cartridge to one of claims 1 to 13, characterised in that, the air inlet located at its rear end is in the form of a valve, which closes under axial pressure upon the rear end of the cartridge.

15. Cartridge to claim 14, characterised in that, the air inlet (5) is covered by an air-permeable foam

material in the uncompressed condition, maintained at the rear end of the cartridge in such a manner that it is compressed following axial pressure upon the rear end of the cartridge.

16. Cartridge to claim 13, characterised in that, a non-return valve (5, 9a; 12-14) is provided for the air at its rear end.

17. Cartridge to claim 16, characterised in that, a cap (11) is located at the rear end, fitted with the non-return valve (12-24).

Printed for Her Majesty's Stationery Office, by Croydon Printing Company Limited, Croydon Surrey, 1978.
Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.